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FAUNISTIC NOTE

First record of *Malacosoma franconica* in the Romanian fauna (Lepidoptera, Lasiocampidae)

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Abstract

Malacosoma franconica ([Denis & Schiffermüller], 1775) (Lepidoptera, Lasiocampidae) is reported for the first time in Romania based on a male specimen found in the south-west of the country, on the shore of the Danube, very close to the border with Serbia. DNA barcoding data confirms the morphology-based identification of the specimen and shows that it is genetically similar to other conspecifics from southern and central Europe. An overview of the species' distribution in Serbia and Bulgaria shows that, although the species has a fragmented range and very few records from those areas, its presence in Romania is not completely unexpected given the proximity of records from the above-mentioned countries. The sandy grassland where the Romanian specimen was found corresponds well to the preferred habitat of *M. franconica*. This site, as well as other potentially suitable areas in Romania, deserve further research to assess the distribution and conservation status of this local, often threatened, moth.

Keywords

Barcode index number, Danube shore, DNA barcoding, sandy grassland.

Malacosoma franconica ([Denis & Schiffermüller], 1775) is a species of Lasiocampidae with a wide distribution ranging from western Europe to Kazakhstan and northern Iran. Nevertheless, this distribution is very fragmented, with scattered populations and large areas uninhabited by the species. In Europe it is mostly found in the Mediterranean region (predominantly France, Italy and the Balkans) (e.g. Leraut

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2006) and in Crimea (Efetov and Budashkin, 1990). North of the Alps the moth has only few populations, mainly in north-eastern Germany, lacking from north-western, northern and north-eastern Europe (Gelbrecht et al. 2001).

Sampling

Field work in the study area was carried out on 23 June 2023, 11 May 2025, 6 June 2025, 22 June 2025 and 1 July 2025.

DNA barcoding

A DNA barcode (i.e. a 658 base-pair long fragment of the 5' end of the mitochondrial cytochrome c oxidase subunit 1 (COI) gene) was obtained from the *M. franconica* specimen originating from Romania. Genomic DNA was extracted from one dried leg using the QIAmp DNA Mini Kit (250) (Qiagen). The DNA barcode was amplified by polymerase chain reaction using the primers LepF1: 5'-ATTCAACCAATCATAAAGATATTGG-3' and LepR1: 5'-TAAACTTCTGGATGTCCAAAAAATCA-3' (Hebert et al. 2004). The M13R_20 universal primer tail (5'-GGATAACAATTTCACACAGG-3') was attached to LepF1. Double-stranded DNA was amplified in 50-µL reactions containing 9-µL Milli-Q water, 25-µL AccuStart Mix 2X, 1-µL Loading Dye 50X, 5-µL of each primer (1-µM) and 5-µL of extracted DNA. The thermal cycling profile was: first denaturation at 94°C for 3 minutes, followed by 5 cycles of 94°C for 30 seconds, 45°C for 30 seconds, and 72°C for 50 seconds, 35 cycles of 94°C for 30 seconds, 51°C for 30 seconds and 72°C for 50 seconds. DNA sequencing was done unidirectionally by Macrogen.

The obtained COI sequence (sample ID VED23H036, BOLD process ID VEDS036-25) is publicly available in DS-FRANCON (dx.doi.org/10.5883/DS-FRANCON) from the Barcode of Life Data Systems (BOLD) (Ratnasingham and Hebert 2007). This sequence was compared with data from the public animal library of BOLD (https://id.boldsystems.org/), which outputs sequence identification confidence (percentage), as well as barcode index numbers (BINs) (Ratnasingham and Hebert 2013).

Material: *M. franconica*, Romania, Mehedinți county, ca 1 km south-west of Izvoru Frumos, 50 m, 23. vi. 2023, 44.4458°N, 22.4821°E, 1♂, leg. C. Chiper.

The specimen (Fig. 1) was found in an open sandy area with characteristic vegetation, approximately 300 m from the shore of the Danube (Fig. 2), extremely close to the border with Serbia (Fig. 3). A three-hour search for larvae done on 11 May 2025, as well as subsequent field trips done in June 2025 did not result in the detection of additional specimens.

The DNA barcode of the Romanian specimen was most similar to other *M. franconica* COI sequences present in BOLD. It displayed a similarity higher than 99% to seven European specimens of *M. franconica* belonging to BIN BOLD:ABZ4136. The least diverged was a Croatian specimen (99.54% similarity), while the other specimens

Figure 1. Male of *M. franconica* from Romania, Mehedinți county, ca 1 km south-west of Izvoru Frumos, 50 m, 23. vi. 2023. Scale bar is 10 mm. Photo: V. Dincă.

originated from Italy (southern mainland and Sicily), France (Corsica), and Germany (country from where the species has been described).

Four other specimens of *M. franconica* from the same BOLD comparison output belonged to a different BIN (BOLD:AAY8950), and originated from Crimea, Turkey and the Caucasus area. The highest similarity to our Romanian specimen was 97.72%.

The external morphology and the DNA barcoding data clearly show that the Romanian specimen reported here belongs to *M. franconica*, differing by three to six COI mutations from other southern and central European specimens (all belonging to a single BIN). Interestingly, this species forms a second "eastern" BIN in BOLD, indicating the presence of notable mitochondrial genetic divergence that may require further research.

Malacosoma franconica was described from Frankfurt am Main, Germany, from where it has become extinct over 100 years ago (Gelbrecht et al. 2001), probably due to habitat destruction. Records older than 100 years from Switzerland are due to confusion with *Malacosoma alpicola* Staudinger, 1870 (Pro Natura 2000).

Figure 2. Place of capture of *M. franconica* in Romania, Mehedinți county, ca 1 km south-west of Izvoru Frumos, 50 m, photographed on 23. vi. 2023. The Danube and Serbian territory can be seen in the background. Photo: C. Chiper.

Like many other Lasiocampidae, this species displays a certain degree of sexual dimorphism: males have a wing span of 20–25 mm, while females are larger, with a wing span of 28–38 mm (Freina and Witt 1987). Females are notably more reddish and lack the lighter regions from the discal areas of the wings, which represent a characteristic of the males. The Romanian male specimen has a wingspan of 25 mm and its phenotype is typical for the species.

The species is univoltine and it overwinters as an egg. The larvae develop in spring and, until the last instar, are gregarious and form nests. They are polyphagous and feed on a variety of plants belonging to genera such as *Rumex*, *Achillea*, *Artemisia*, *Euphorbia*, *Erodium*, *Festuca*, *Heliochrysum*, *Armeria*, *Vicia*, *Hedysarum* etc. (Gelbrecht et al. 2001; Bertaccini 2020). The adults are on wing between June and August, depending on the climatic particularities of a given site. The collection date of the Romanian male specimen falls well within the phenology of this species, and is in line with the latitude and low elevation of the site.

Malacosoma franconica inhabits open, usually xeric areas, such as sandy grasslands, dry slopes, or nutrient poor pastures. Larvae have also been found in relatively ruderal areas, such as arable land on sandy soil that has been abandoned for a few years (Alberti 1952; Freyna and Witt 1987; Bertaccini et al. 1994; Gelbrecht

et al. 2001). The altitudinal distribution varies considerably depending on region, so that the species can be found from sea level to 2800–3100 m in Iran (Zolotuhin and Zahiri 2008). The area where the Romanian specimen was captured represents a fairly typical habitat for this species, consisting of open, sandy grassland near the shores of the Danube. The eastern side of the site is also partially bordered by forest (mainly *Robinia pseudoacacia*). The presence of forest seems to represent an important feature of habitats in Germany for example, where such forested areas seem to act as buffer zones, preventing drift of nutrients or the arrival of pesticides from agricultural areas (Gelbrecht et al. 2001).

Figure 3. Records of *Malacosoma franconica* from Romania (blue square) and its neighbouring countries Serbia and Bulgaria (black dots).

In the surroundings of Romania, the nearest sites of occurrence are in Bulgaria and Serbia. In Bulgaria, *M. franconica* is known from only a handful of sites, most of them in the southern half of the country (Ganev 1984; Abadjiev and Beshkov 2007; Hristova and Beshkov 2016; Beshkov and Nahirnić-Beshkova 2021). The northernmost locality is Varna (Ganev 1984), in the north-eastern part of the country (Fig. 3), which is also the Bulgarian site that is nearest to the south-eastern Romanian border (approximately 65 km). A notable additional record from Bulgaria comes from Melnik (1 female collected on 25. vi. 1989, leg. István Juhász). To the best of our knowledge, this record, together with a female found in May 2024 in the Struma Valley (Kresna – Vlahi) (Beshkov and Nahirnić-Beshkova 2025), represent the only known sites of *M. franconica* in south-western Bulgaria (Fig. 3). Another male specimen was found by I. Juhász on the car windscreen near the Rhodope Mountains, on 27. v. 2009. While this suggests the presence of the species in the area, the precise origin of that specimen cannot be inferred. The species has been reported from the eastern Rhodopes (Hristova and Beshkov 2016; Beshkov and Nahirnić-Beshkova 2021).

In Serbia, to the best of our knowledge, *M. franconica* has been reported from only two localities in the east of the country (Timochka Kraina and Deliblatska Pescara) (Gradojević 1963; Zečević 1975, 1976). These sites are near the south-western border of Romania (Timochka Kraina, approximately 65 km and Deliblatska Pescara, less than 10 km) and also represent the nearest populations to the Romanian locality reported here (approximately 72 km and 105 km) (Fig. 3). The location of the Serbian records does suggest the potential presence of *M. franconica* in other regions of Romania as well, particularly near Deliblatska Pescara, which lies very near the Romanian border. Nevertheless, *M. franconica* can often have geographically fairly isolated populations and the key to increasing chances of finding new populations in Romania is the identification of potentially suitable habitats.

Although *M. franconica* was listed as present in Romania by Karsholt & Razowski (1996), we found no evidence supporting this inclusion. The species was not listed in any catalogue of Romanian Lepidoptera (Popescu-Gorj 1987, Rákosy et al. 2003, Rákosy & Goia, 2021, Rákosy et al. 2021) and we are not aware of any report of this moth in the country. Therefore, the data presented in this paper represent the first record of *M. franconica* in Romania.

Protection and conservation

Habitats of *M. franconica* are often menaced by both anthropogenic and natural factors such as conversion into arable land, nutrient and pesticide inputs, afforestation or natural succession (Gelbrecht et al. 2001). As such, the species is included in the red lists of certain countries such as Germany (regarded as threatened with extinction, Rennwald et al. 2011), or Bulgaria (assessed as endangered, Hristova and Beshkov 2016).

The current data are obviously too limited to infer the conservation status of this species in Romania, although it is likely the moth occurs very locally in the country. The place where it has been found in Romania lies just outside the Natura 2000 site

ROSCI0306 Jiana, a large protected area of over 13250 ha, consisting among others of a mixture of riparian mixed forests, steppic woods with *Quercus*, *Salix* and *Populus* gallery forests, as well as sandy grasslands. Thus, further investigations are necessary to determine the presence and estimate the abundance of *M. franconica* in this area and, if necessary, to establish appropriate management measures. Depending on future findings, the inclusion of *M. franconica* among the species protected by law in Romania may be brought into discussion.

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